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ON THE

BLOOD-CORPUSCLES OF THE HUMAN EMBRYO.

By James Paget.

The examination of an embryo between three and four lines long, and about four weeks old, given to me by my friend Dr. Brownless, afforded an opportunity of examining the human blood at an earlier period of life than in any instance yet, within my knowledge, recorded.

The blood was observed as it flowed from the omphalo-mesenteric vessels, and afterwards while its corpuscles lay singly or in clusters. The great majority of the red corpuscles presented a circular outline, and, as they rolled over, appeared spheroidal and vesicular, or like cells filled, but not tensely, with a clear red, jelly-like substance. Their surfaces were quite smooth; and as they dried, instead of merely shrivelling and becoming granulated, portions of their edges were incurved and folded towards their centres, a change of form common in all the nucleated mammalian red blood-corpuscles. They were full-coloured; even, apparently, more deeply red than the blood-corpuscles of an adult.

The nuclei of these spheroidal blood-corpuscles were circular, with dark, well-defined outlines, and darkly nebulous, as if somewhat granulated; they appeared to be attached to the inner surface of the cell-wall, and according to the position in which the cell rested, were seen either in the centre, or near to some part of the circumference. All the blood-corpuscules of the embryo were thus nucleated. I found, indeed, five or six red blood-corpuscles without nuclei, but these were not mingled with the nucleated ones, and in size and every other character so exactly resembled those of the adult that I have no doubt they were derived from the maternal blood, with a portion of which the embryo may have accidentally come in contact in taking it from the ovum.

Besides these spheroidal blood-corpuscles with single nuclei, there were not a few which contained two nuclei. Of these, some were spheroidal, but more were of ovoid shape, and larger than the rest. Their nuclei lay, in some, in close contact, as if one nucleus were dividing into two; in some they were just apart; in some far asunder, occupying the opposite ends of the oval cell.

The spheroidal corpuscles measured from 1-2100 to 1-2800 of an inch in diameter: their nuclei from 1-3700 to 1-4500.* Among the oval bi-nucleated corpuscles I found these measurements; 1-1500 by 1-2300 of an inch; 1-1600 by 1-3000; 1-1700 by 1-1800; and the nuclei of these (whose various apparent forms may be ascribed to their being seen in different positions) measured from 1-3700 to 1-4500 of an inch.

In the crowd of cells that formed the tissues and rudimental organs of the embryo, and of which many were loosely scattered over the field of view, it was not easy to discover any colourless blood-corpuscles; but I saw some resembling the nucleated red-corpuscles in every thing but colour: so that there can be little doubt that the development of the human blood corresponds with that of the other mammalia in this, as in other respects—namely, that a colourless state precedes the coloured state of the nucleated red-corpuscles.

The foregoing description of the corpuscles of the human embryo, confirms that which is inserted in Dr. Kirkes' Handbook of Physiology (p. 66), and which was drawn from the blood of a fœtus about five months old, for which I have also to thank Dr. Brownless. In that fœtus, in connection, perhaps, with malformation of the liver and other abdominal organs, the development of the blood appeared to be partially arrested, and many corpuscles existed presenting still the nucleated form which, in ordinary cases, disappears, I believe, after the third month of intra-uterine life. In the blood of that fœtus, also, as in that of three months old described by Kölliker* and Fahrner†—the two sets of blood-corpuscles were mixed; *i. e.* the blood contained both nucleated corpuscles characteristic of the earliest period of life, and corpuscles without nuclei, such as, being formed from lymph-corpuscles, gradually supersede the nucleated set, and are maintained by repeated production through all the rest of life. But the examination of this much younger embryo shows that in the earliest periods of the human embryo, as in that of other mammalia, all the blood-corpuscles are nucleated.

Further examinations are required to determine at what period the nucleated corpuscles begin to be superseded by the non-nucleated ones which form the second set. For this, embryos should be examined in which the branchial fissures are just closed; for the analogy of the embryos of several species makes it probable that, at this time, the lymph would begin to be formed.

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* The distinctness of the nuclei in the blood-corpuscles of the mammalian embryo, in which they may be seen even more plainly than in the blood of reptiles, may be referred to as adding to the improbability of the supposition that nuclei may exist in adult mammalian blood-corpuscles without being discernible.

* Ueber die Blutkörperchen eines menschlichen Embryo . . in Henle und Pfeiffer's Zeitschrift. 1846.

† De Globulorum sanguinis. . . . origine. Turici, 1845.

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